TOTAL FATTY ACID QUANTIFICATION AS AN ESTIMATOR OF TOTAL BODY FAT CONTENT IN BROILERS FED UNSATURATED DIETS

Villaverde C., Cortinas L., Ortego M., Barroeta A.C. y Baucells M.D.
Dept. Animal and Food Science, Facultat de Veterinària, Universitat Autònoma de Barcelona, E-08193, Bellaterra, Spain.
MariaDolores.Baucells@uab.es

INTRODUCTION

The use of animal fat (mainly saturated fat) in poultry diets has been reduced due mainly to two reasons: the higher wealthy benefits of unsaturated fat in human nutrition and the restrictions in the use of animal fat in animal nutrition. Unsaturated fatty acids are better absorbed and thus provide more metabolizable energy to the animal. But it remains unclear in poultry if this "extra" energy uptake results in higher fat deposition.

OBJETIVE

This study was designed to asses the effect of dietary polyunsaturated fatty acids (PUFA) on the total fat content of broilers, measured as hydrolysed crude fat (CF) and as total fatty acids (TFA) content.

MATHERIAL AND METHODS

Animals: 96 female broiler chickens

Treatments: 4 dietary unsaturation levels : 15, 34, 45 and 61 g PUFA/kg diet (achieved by replacing linseed and fish oil to a basal diet with 9% tallow).

Samples: 96 animals slaughtered at 44 days (2318 ± 109.8 g) Whole chickens (including blood and feathers) minced and freeze-dried.

Analysis:

1. Crude fat (CF) crude protein (CP), ashes (A) and gross energy (GE) content.
2. Total fatty acids (TFA) content (quantification: C19:0 as internal standard).

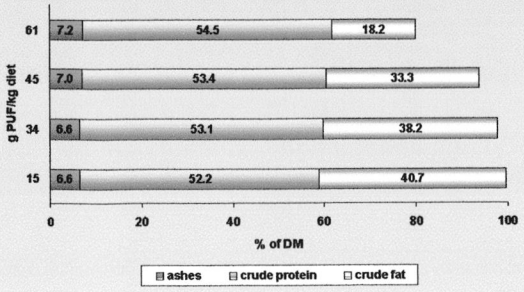
1. AOAC, 1995. Official Methods of Analysis. 16th ed. Arington, Va.
2. Carrapiso et al., 2000. Meat Science 56:159-164.

RESULTS

The chemical composition of the whole animal body (% of DM) is shown in figure 1. CP and A content are not affected by treatment. But nevertheless CF is drastically reduced (up to **55%**, $p<0.001$) when dietary PUFA content increases from 15 to 61 g/kg.

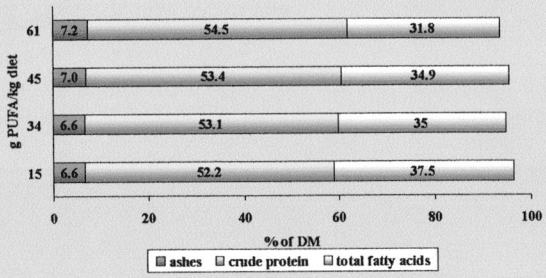
The total chemical composition (TTC, considered as the sum of CF, CP and A, being negligible the carbohidrate amount) on a DM basis should be close to 100%. Only in the more saturated treatments is this true, reaching only 80% when feeding 61 g dietary PUFA/kg. This finding suggests that CF analyses of highly unsaturated samples may underestimate body fat content

Figure 1: Effect of dietary PUFA on the chemical composition of the whole chicken (% of DM): ashes, crude protein and crude fat content. (Different letters indicate differences in crude fat content).



When using TFA, instead of CF, to estimate the whole body fat content of the chickens (as is shown in figure 2) we can still see a reduction of body fattening ($p<0.05$) but only of 15% between the 15 and 61 g PUFA/kg diets. The TTC is close to 95% in all treatments.

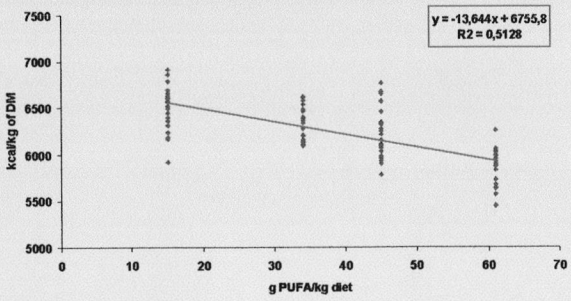
Figure 2: Effect of dietary PUFA on the chemical composition of the whole animal (% of DM): A, CP and TFA content.



GE content of the whole animal can be an indicator of the total body fattening, given that the main energy storage of the chickens is in form of fat. The GE content of the chicken's body can be observed in figure 3.

The GE content of the animals (Kcal/kg of DM) is reduced only a **10%** when dietary PUFA increase from 15 to 61 g/kg ($p<0.01$). The magnitude of this reduction is similar to the TFA reduction, suggesting that TFA is a good estimator of body fattening,

Figure 3: Effect of dietary PUFA on gross energy content of the whole animal (kcal/kg DM)



CONCLUSION

Our work showed a reduction of the energy storage (mainly body fat) as the PUFA intake increased and that total fatty acids content can be an acceptable estimator of the whole body fat content, and was even more precise than hydrolised crude fat determination in the case of highly unsaturated meats.

The authors are grateful to Agrupación de Fabricantes de Aceites Marinos, S.A. for the donation of the fish oil used. This work was supported, in part, by research grant from the Generalitat de Catalunya, and the Comisión Interministerial de Ciencia y Tecnología (CICYT).